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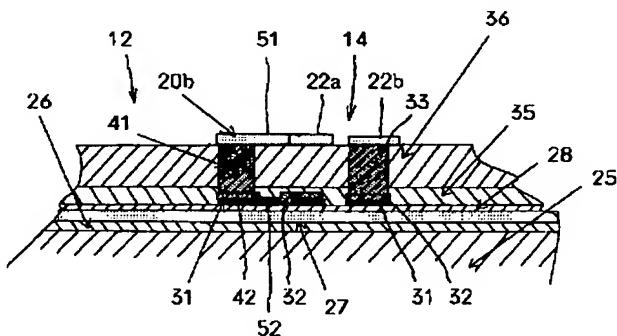
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(54)【発明の名称】磁気ヘッド素子の製造方法

(57)【要約】

【課題】 E LG素子形成幅を狭くし、磁気ヘッド素子の取り数を多くすることができる磁気ヘッド加工用E LG素子端子の形成方法を提供する。

【解決手段】 磁気ヘッド素子12とE LG素子14とが交互に隣接して複数個形成されたバー状体50を、E LG素子14のセンス部30の抵抗値をモニターしながら研磨し、研磨後、E LG素子部14を切断、除去して磁気ヘッド素子12を個片に分離する磁気ヘッド素子12の製造方法において、E LG素子14のセンス部30に接続する引出し層32を、隣接する磁気ヘッド素子12の直近する内部引出し層42に接続部52を介して接続し、該内部引出し層42に接続して形成されE LG素子14に直近する外部導出用の端子柱41の頂面に形成された外部接続用パッド20bと、E LG素子14のモニター用パッド22aとを接続部51を介して接続することにより、端子柱41を磁気ヘッド素子12用とE LG素子14用とに兼用して用いることを特徴とする。



【特許請求の範囲】

【請求項1】 磁気ヘッド素子とELG素子とが交互に隣接して複数個形成されたバー状体を、ELG素子のセンス部の抵抗値をモニターしながら研摩し、研摩後ELG素子部を切断、除去して磁気ヘッド素子部を個片に分離する磁気ヘッド素子の製造方法において、前記ELG素子のセンス部に接続する引出し層を、隣接する前記磁気ヘッド素子の直近する内部引出し層に接続部を介して接続し、該内部引出し層に接続して形成された前記ELG素子に直近する端子柱の頂面に形成された外部接続用パッドと、前記ELG素子のモニター用パッドとを接続部を介して接続することにより、前記端子柱を前記磁気ヘッド素子用とELG素子用とに兼用して用いることを特徴とする磁気ヘッド素子の製造方法。

【請求項2】 前記磁気ヘッド素子は、端部側に素子部が形成され、他の部位に該素子部と内部引出し層および端子柱を介して接続する複数の外部接続用のパッドが形成されたサイド素子配置型の磁気ヘッド素子であり、前記ELG素子の2つのモニター用パッドのうち、前記磁気ヘッドの外部接続用パッドに近い一方のパッドは、前記接続部を介して、直近の前記外部接続用パッド、前記端子柱、前記内部引出し層および前記接続部を介してELG素子側の一方の引出し層に接続され、前記他方のモニター用パッドは、ELG素子側に形成された端子柱、他方の引出し層を介してELG素子のセンス部に接続していることを特徴とする請求項1記載の磁気ヘッド素子の製造方法。

【請求項3】 前記磁気ヘッド素子は、中央側に素子部が形成され、該素子部を挟む両側に、該素子部と内部引出し層および端子柱を介して接続する複数の外部接続用のパッドが形成されたセンター素子配置型の磁気ヘッド素子であり、前記ELG素子の2つのモニター用パッドは、前記接続部を介して、両側に隣接する磁気ヘッド素子の互いに直近する前記外部接続用パッド、前記端子柱、前記内部引出し層、前記接続部、ELG素子側の引出し層を介してELG素子のセンス部に接続していることを特徴とする請求項1記載の磁気ヘッド素子の製造方法。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明はモニター用のELG(Electro Lapping Guide)素子を幅狭に形成でき、取り数を多くできる磁気ヘッド(MR/GMRヘッド)素子の製造方法に関する。

【0002】

【従来の技術】 磁気ディスク装置等で用いられる磁気ヘッド素子は、ウエハ状に形成したセラミックの基板に磁性膜や非磁性膜等を成膜し、MR素子等のセンス部を含む磁気抵抗効果型ヘッド(再生ヘッド)、電磁変換ヘッド(記録ヘッド)から成る素子部と、これらに接続する

端子(パッド)を形成することにより基板上に多数作り込まれる。

【0003】 この磁気ヘッド素子の製造に際しては、基板に素子部と端子等を形成した後、ウエハを細いバー状体10(図6)に切り出し、バー状体(ワーク)の側面を研摩する加工を行う。バー状体10は数十個程度の磁気ヘッド素子12が並列した形状にウエハを切り出したものである。

【0004】 バー状体10の側面を研摩するのは、成膜されたMR素子等のセンス部の高さ(MRハイト)を所要高さに調整するためである。このセンス部の高さは低い程度がよくなる。最近の磁気ヘッド素子におけるMRハイトは0.8μm±0.2μmの高さおよび精度が要求されているが、将来的には0.4μm±0.05μmの高さおよび精度が要求されている。

【0005】 上記のようにセンス部の精度が非常に厳しく要求されているので、バー状体10の研摩をどのように制御するかが問題となる。バー状体10の研摩を制御する従来方法の一つがELG素子を利用する方法である。

【0006】 ELG素子14は、バー状体10において、各磁気ヘッド素子12に隣接して作り込まれる。各ELG素子14は各隣接する磁気ヘッド素子12の研摩量を制御するために用いられる。バー状体10には前記のように数十個の磁気ヘッド素子12が作り込まれて、各々非常に厳しい精度が要求される。そこで、各磁気ヘッド素子12に対して1つずつモニター用のELG素子14を隣接して配置し、各磁気ヘッド素子12の研摩量を個別に制御して研摩精度を高めるようにしているのである。

【0007】 図6において、16は磁気ヘッド素子12の素子部である。また18a、18bは再生用の外部接続用パッド、20a、20bは記録用の外部接続用端子であり、バー状体10の表面に形成されている。ELG素子14の表面にも、モニター用のパッド22a、22bが形成されている。

【0008】 図7は図6におけるELG素子14のA-A'線断面図である。図8は図6におけるELG素子14のa-a'線断面図である。25はアルチック基板などの非磁性基板、26は非磁性基板25上に形成されたアルミナ等から成る基板保護膜である。この基板保護膜26上にセンドストから成る下部シールド層が形成される。下部シールド層27上にリードギャップとなるアルミナ層28が形成され、このアルミナ層28上に公知のMR素子部(センス部)30が形成される。

【0009】 31、31は磁区制御用の、CoCrPtからなるハード膜層であり、MR素子部30の両端に接続している。32、32はハード膜層31、31上に形成された銅等から成る引出し層である。

【0010】 引出し層32、32の端部には、図8に示

されるように銅等から成る端子柱33が形成される。この端子柱33は、レジスト層(図示せず)に形成した穴内にめっきによって形成される。レジスト層は除去される。

【0011】アルミナ層28上および引出し層32、32上にはリードギャップ並びにライトギャップとなるアルミナ層35が形成される。さらにこのアルミナ層35および端子柱33を覆って保護層となるオーバーコートアルミナ層36が形成される。このオーバーコートアルミナ層36を端子柱33が露出するまで研磨し、露出した端子柱33の頂面に金パッドからなるモニター用のパッド22a、22bが形成される。

【0012】磁気ヘッド素子12も、非磁性基板25上に公知の手法により、特にセンス部の構造がELG素子14とほぼ同様の膜構造によって形成される。外部接続用パッド18a、18bは、ELG素子14側の端子柱33と同様に形成した銅等から成る端子柱38、38(図6に点線で示した)、銅等から成る内部引出し層39、39、およびハード膜層(図示せず)を介して素子部16のMR素子等から成るセンス部(図示せず)に接続する。

【0013】同様に、外部接続用パッド20a、20bは、ELG素子14側の端子柱33と同様に形成した銅等から成る端子柱41、41(図6に点線で示した)、銅等から成る内部引出し層42、42を介して素子部16の薄膜コイル導体層(図示せず)に接続する。

【0014】上記バー状体10は、所定の治具(図示せず)に貼着され、図6のP面が研磨される。ELG素子14のMR素子部30と磁気ヘッド素子12中のMR素子部が同時に研磨される。研磨治具には各対をなす磁気ヘッド素子12とELG素子14とを個別に研磨面に押圧するシリンダ等の押圧治具(図示せず)が装着され、研磨速度が調節され、各磁気ヘッド素子12の研磨が同時に終了するように制御される。

【0015】研磨の際、ELG素子14はパッド22a、22bを介してモニター(図示せず)に接続され、MR素子部30が研磨されることによるMR素子部30の抵抗値変化が計測される。磁気ヘッド素子12のMR素子部とELG素子14のMR素子部30とは同形あるいは一定の相似形に形成されている。MR素子部30の抵抗値変化を計測することにより磁気ヘッド素子12側のMR素子部の抵抗値変化が計測可能になり、これにより磁気ヘッド素子12側のMR素子部のMRハイドが所要値となったところで研磨を終了するように制御される。

【0016】上記のように、各磁気ヘッド素子12毎にモニター用のELG素子14を配置することで、MRハイドを高精度で制御できる。研磨終了後、バー状体10はELG素子14部分が切断除去されて各個片の磁気ヘッド素子12に完成される。

【0017】

【発明が解決しようとする課題】ELG素子14部分はモニター用として使用されるだけで、製品としては不要の部分で、最終的には除去される部分であるから、1つのバー状体10からできるだけ多数の磁気ヘッド素子12を得るには、ELG素子14の幅はできるだけ狭いことが望まれる。

【0018】ところで、図9は、端子柱33、38、41(高さ20~30μm程度)を形成後、端子柱33、38、41を覆ってオーバーコートアルミナ層36を形成した状態を示す。このオーバーコートアルミナ層36はスパッタリングによって形成されるが、その際、端子柱33、38、41のステップカバリッジの影響により、端子柱の陰になる部分に異常成長層37(破線で示す)が生じる。

【0019】端子柱の間隔が狭いと、異常成長層37は高くなり(図10)、成膜後の平坦化研磨で端子柱を露出させるときに穴があく(なおQは研磨面を示す)。これを防止するために、端子柱間の間隔は最低100μmを要する。また、ELG素子14を切断する際も、この異常成長層37を切断すると、異常成長層37は脆く、したがってチッピングの原因となり避けなければならない。そのため、端子柱と切断部との間の間隔も55μm以上とる必要がある。上記より、ELG素子14を形成する幅は端子柱形成スペースで決定され、最低300μmは必要であり、これ以上の幅狭化には限界があった。

【0020】そこで、本発明は上記課題を解決すべくなされたものであり、その目的とするところは、ELG素子形成幅を狭くし、磁気ヘッド素子の取り数を多くすることができる磁気ヘッド素子の製造方法を提供するにある。

【0021】

【課題を解決するための手段】本発明は上記目的を達成するため次の構成を備える。すなわち、本発明は、磁気ヘッド素子とELG素子とが交互に隣接して複数個形成されたバー状体を、ELG素子のセンス部の抵抗値をモニターしながら研磨し、研磨後ELG素子部を切断、除去して磁気ヘッド素子部を個片に分離する磁気ヘッド素子の製造方法において、前記ELG素子のセンス部に接続する引出し層を、隣接する前記磁気ヘッド素子の直近する内部引出し層に接続部を介して接続し、該内部引出し層に接続して形成されたELG素子に直近する端子柱の頂面に形成された外部接続用パッドと、前記ELG素子のモニター用パッドとを接続部を介して接続することにより、前記端子柱を前記磁気ヘッド素子用とELG素子用とに兼用して用いることを特徴としている。

【0022】前記磁気ヘッド素子は、端部側に素子部が形成され、他の部位に該素子部と内部引出し層および端子柱を介して接続する複数の外部接続用のパッドが形成されたサイド素子配置型の磁気ヘッド素子であり、前記

ELG素子の2つのモニター用パッドのうち、前記磁気ヘッドの外部接続用パッドに近い一方のパッドは、前記接続部を介して、直近の前記外部接続用パッド、前記端子柱、前記内部引出し層および前記接続部を介してELG素子側の一方の引出し層に接続され、前記他方のモニター用パッドは、ELG素子側に形成された端子柱、他方の引出し層を介してELG素子のセンス部に接続しているものを用いることができる。

【0023】また前記磁気ヘッド素子は、中央側に素子部が形成され、該素子部を挟む両側に、該素子部と内部引出し層および端子柱を介して接続する複数の外部接続用のパッドが形成されたセンター素子配置型の磁気ヘッド素子であり、前記ELG素子の2つのモニター用パッドは、前記接続部を介して、両側に隣接する磁気ヘッド素子の互いに直近する前記外部接続用パッド、前記端子柱、前記内部引出し層、前記接続部、ELG素子側の引出し層を介してELG素子のセンス部に接続しているものを用いることができる。

【0024】上記のように、従来ELG素子内部に形成していた端子柱を省略し、磁気ヘッド素子側の端子柱を利用することで、ELG素子の幅を狭くでき、したがって磁気ヘッド素子の取り数を多くでき、生産効率をあげることができる。

【0025】

【発明の実施の形態】以下、本発明の好適な実施の形態を添付図面に基づいて詳細に説明する。図1はバー状体50の正面図である。図2は、図1のB-B'線断面図である。図3は図1のc-c'線断面図である。図4は図1のb-b'線断面図である。図6、図7、図8と同じ部材は同一符号をもって示し、説明を省略する。なお、図1のA-A'線断面図は図7と同じ態様になり、図1のa-a'線断面図は図8と同じ態様になる。

【0026】本実施の形態では、ELG素子14のモニター用のパッド22aに接続する銅等から成る端子柱33(図8)を形成せず、この端子柱33の代わりに隣接する磁気ヘッド素子12の中のELG素子14に一番近い端子柱41を利用するようにしている。そのために、パッド20aとパッド22aとを幅狭の接続部51で接続するようにしている。また、図に示すように、内層側の、ELG素子14側の銅等から成る引出し層32と、磁気ヘッド素子12側の一番近い内部引出し層42とを幅狭の接続部52で接続している。

【0027】接続部51は、金のパッド20a、22aをスパッタリングにより作り込む際に同時に作ることはもちろんである。また、接続部52も、引出し層32、内部引出し層42をスパッタリングにより作り込む際に同時に作ることができる。本実施の形態では、図2に明確なように、従来は端子柱41と端子柱33との間に存在したELG素子14側のもう一つの端子柱33を省略できる。

【0028】図2において、ELG素子14形成幅を狭くしても、端子柱41と端子柱33との間の幅は十分大きく設定できるから、両端子柱間でのオーバーコートアルミナ層36の異常成長層の発生を小さくすることができる。したがって、ELG素子14を切断、除去してもチッピング発生のおそれを解消できる。また、ELG素子14を切断、除去した後、接続部51、接続部52の一部が磁気ヘッド素子12側に残ることになるが、残留する接続部51、接続部52は短いものであるため、電気特性に影響を与えることはほとんどない。

【0029】上記では、記録用のパッド20aに接続する端子柱41をELG素子14側の端子柱として共用するようにしたが、再生用のパッド18a、18bがELG素子14側に配置されているときは、当該再生用のパッド18a、18bに接続する端子柱39のうちのELG素子14に近い側の端子柱39を共用するようにすることはもちろんである。

【0030】また、上記では、素子部16が磁気ヘッド素子12(スライダ)の端部に位置するサイド素子配置の場合の実施の形態を示した。図5に示すように、素子部16が、再生用のパッド18a、18bと記録用のパッド20a、20bとの間に配置されているセンター素子配置の磁気ヘッド素子12の場合には、ELG素子14の幅をさらに狭く設定できる。

【0031】すなわち、この場合には、ELG素子14の両側に直近して、一方の磁気ヘッド素子12の再生用のパッド18aと他方の磁気ヘッド素子12の記録用のパッド20bとが位置している。したがって、ELG素子14の両端子柱33、33を省略し、ELG素子14のパッド22aをパッド20bに幅狭の接続部53で接続し、ELG素子14の他方のパッド22bをパッド18aに幅狭の接続部54で接続する。また内層側のELG素子14の一方の引出し層32を隣接する磁気ヘッド素子12の内部引出し層42に幅狭の接続部55で接続しELG素子14の他方の引出し層32を隣接する磁気ヘッド素子12の内部引出し層39に幅狭の接続部56で接続する。

【0032】すなわち、ELG素子14に隣接する2つの磁気ヘッド素子12の直近の端子柱38と41とをELG素子14用に共用するのである。これにより、ELG素子14側には端子柱が存在しないから、ELG素子14の幅をさらに狭いものに設定できる。

【0033】以上本発明につき好適な実施例を挙げて種々説明したが、本発明はこの実施例に限定されるものではなく、発明の精神を逸脱しない範囲内で多くの改変を施し得るのはもちろんである。

【0034】

【発明の効果】本発明に係る磁気ヘッド素子の製造方法によれば、上述したように、従来ELG素子内部に形成していた端子柱を省略し、磁気ヘッド素子側の端子柱を

利用することで、ELG素子の幅を狭くでき、したがって磁気ヘッド素子の取り数を多くでき、生産効率をあげることができる。

【図面の簡単な説明】

【図1】バー状体の正面図、
 【図2】図1のB-B'線断面図、
 【図3】図1のc-c'線断面図、
 【図4】図1のb-b'線断面図、
 【図5】磁気ヘッド素子がセンター素子配置型の場合のバー状体の正面図、
 【図6】従来のバー状体の正面図、
 【図7】図6のA-A'線断面図、
 【図8】図6のa-a'線断面図、
 【図9】オーバーコートアルミナ層における異常成長層の説明図、
 【図10】オーバーコートアルミナ層における異常成長層の説明図である。

【符号の説明】

12 磁気ヘッド素子
 14 ELG素子

16 素子部

18a, 18b 再生用の外部接続用パッド

20a, 20b 記録用の外部接続用パッド

22a, 22b モニター用のパッド

25 非磁性基板

26 基板保護膜

27 下部シールド層

28 アルミナ層

30 センス (MR素子) 部

10 31 ハード膜層

32 引出し層

33 端子柱

35 アルミナ層

36 オーバーコートアルミナ層

38 端子柱

39 内部引出し層

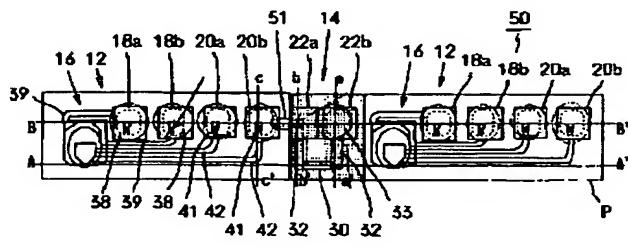
41 端子柱

42 内部引出し層

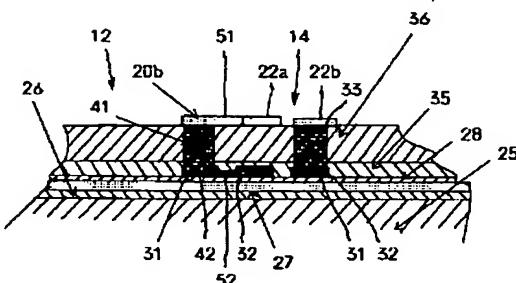
50 バー状体

20 51, 52, 53, 54, 55, 56 接続部

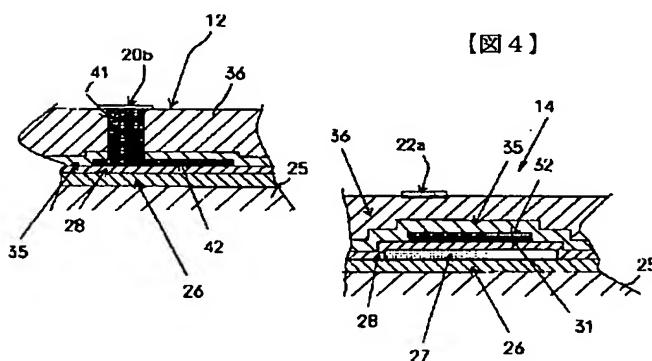
【図1】



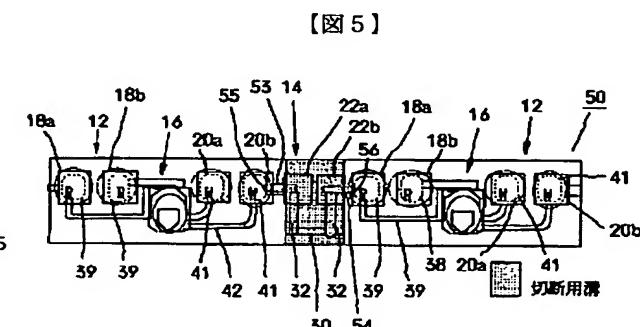
【図2】



【図3】

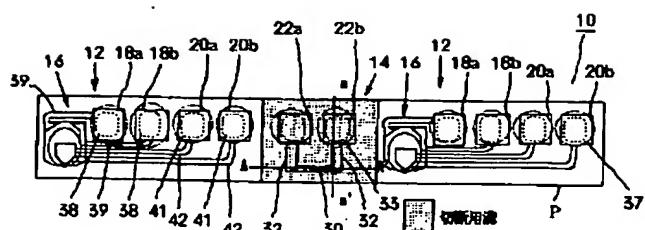


【図4】

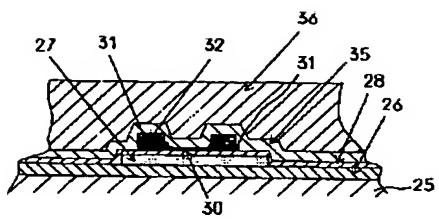


【図5】

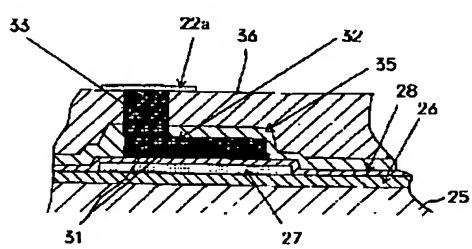
【図 6】



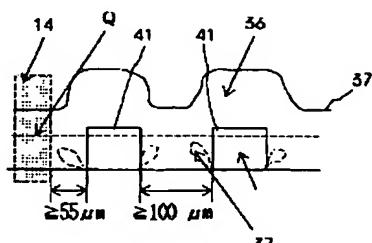
【図 7】



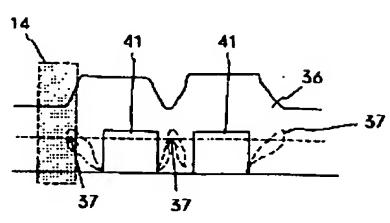
【図 8】



【図 9】



【図 10】



PATENT ABSTRACTS OF JAPAN

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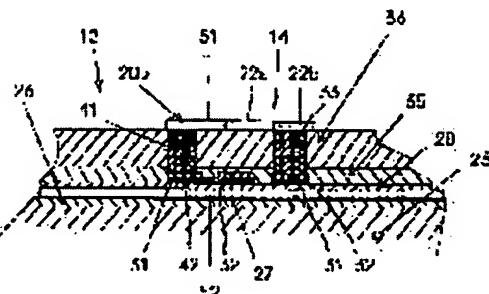
(22)Date of filing : 21.12.1998 (72)Inventor : WATANUKI KIICHI

(54) MANUFACTURE OF MAGNETIC HEAD ELEMENT

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a method for the formation of an ELG element terminal for magnetic head machining which can increase the number of obtained magnetic head elements by making ELG element formation width narrower.

SOLUTION: A bar body having magnetic head elements 12 and ELG elements 14 formed alternately and adjacently is polished while the resistance values of the sensing parts of the ELG elements 14 are monitored and after the polishing, the ELG element parts 14 are cut always to separate the individual magnetic head elements 12; and a lead-out layer 32 connected to the sense part of an ELG element 14 is connected to the nearby internal lead-out layer 42 of an adjacent magnetic head element 12 through a connection part 52 and a pad 20b for external connection which is formed on the top surface of a lead-out terminal column 41 near an ELG element 14 and is connected to the internal lead-out layer 42 and the monitor pad 22a of the ELG element 14 are connected through a connection part 51 to use the terminal column 41 for both the magnetic head 12 and ELG element 14.



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CLAIMS

[Claim(s)]

[Claim 1] The bar-like object with which the magnetic-head component and the ELG component adjoined by turns, and were formed [two or more] In the manufacture approach of a magnetic-head component of polishing acting as the monitor of the resistance of the sense section of an ELG component, cutting and removing the ELG component section after polishing, and dividing the magnetic-head component section into the piece of an individual It connects with the internal cash-drawer layer to which said adjoining magnetic-head component carries out the latest of the cash-drawer layer linked to the sense section of said ELG component through a connection. The pad for external connection formed in the top face of the terminal column which it connects with this internal cash-drawer layer, is formed, and carries out the latest to said ELG component, and the pad for monitors of said ELG component by connecting through a connection The manufacture approach of the magnetic-head component characterized by making serve a double purpose and using said terminal column for said object for magnetic-head components, and ELG components.

[Claim 2] Said magnetic-head component is a magnetic-head component of the side component arrangement mold with which the component section was formed in the edge side, and the pad for two or more external connection connected through this component section, an internal cash-drawer layer, and a terminal column was formed in other parts. The pad which is one side near the pad for external connection of said magnetic head between two pads for monitors of said ELG component It connects with one cash-drawer layer by the side of an ELG component through said connection through said pad for external connection, said terminal column, said latest internal cash-drawer layer, and said latest connection. The pad for monitors of said another side is the manufacture approach of the terminal column formed in the ELG component side, and the magnetic-head component according to claim 1 characterized by having connected with the sense section of an ELG component through the cash-drawer layer of another side.

[Claim 3] Said magnetic-head component on both sides which the component section is formed in a central site and sandwich this component section Are the magnetic-head component of the pin center, large component arrangement mold with which the pad for two or more external connection connected through this component section, an internal cash-drawer layer, and a terminal column was formed, and two pads for monitors of said ELG component mind said connection. The manufacture approach of the magnetic-head component according to claim 1 characterized by having connected with the sense section of an ELG component through the cash-drawer layer by the side of said pad for external connection which carries out the latest, said terminal column, said internal cash-drawer layer, said connection, and an ELG component.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention can form the ELG (Electro Lapping Guide) component for monitors in narrow, and relates to the manufacture approach of the magnetic-head (MR/GMR head) component which can make [many] the number of picking.

[0002]

[Description of the Prior Art] the magneto-resistive effect mold head (reproducing head) which the magnetic-head component used with a magnetic disk drive etc. forms a magnetic film, a nonmagnetic membrane, etc. to the substrate of the ceramic formed in the shape of a wafer, and contains the sense sections, such as MR component, and electromagnetism -- a large number are made on a substrate by forming the component section which consists of a conversion head (recording head), and the terminal (pad) linked to these.

[0003] After forming the component section, a terminal, etc. in a substrate on the occasion of manufacture of this magnetic-head component, a wafer is cut down on the thin bar-like object 10 (drawing 6), and processing which polishes the side face of a bar-like object (work piece) is performed. The bar-like object 10 cuts down a wafer in the configuration which about dozens of magnetic-head components 12 arranged in parallel.

[0004] The side face of the bar-like object 10 is polished for adjusting the height (MR height) of the sense sections, such as formed MR component, to necessary height. Sensibility becomes good, so that the height of this sense section is low. Although, as for MR height in the latest magnetic-head component, 0.8micrometer**0.2micrometer height and precision are demanded, 0.4micrometer**0.05micrometer height and precision are demanded in the future.

[0005] Since the precision of the sense section is demanded very severely as mentioned above, how polishing of the bar-like object 10 is controlled poses a problem. It is the approach one of the conventional approaches which control polishing of the bar-like object 10 uses an ELG component.

[0006] In the bar-like object 10, the ELG component 14 adjoins each magnetic-head component 12, and is made. Each ELG component 14 is used in order to control the amount of polishing of the magnetic-head component 12 which each adjoins. Dozens of magnetic-head components 12 are made as mentioned above by the bar-like object 10, and a very severe precision is required respectively. Then, every one ELG component 14 for monitors is adjacently arranged to each magnetic-head component 12, and he controls the amount of polishing of each magnetic-head component 12 according to an individual, and is trying to raise polishing precision.

[0007] In drawing 6 , 16 is the component section of the magnetic-head component 12. Moreover, 18a and 18b are the terminals for external connection for record, and the pad for external connection for playback, and 20a and 20b are formed in the front face of the bar-like object 10. The pads 22a and 22b for monitors are formed also in the front face of the ELG component 14.

[0008] Drawing 7 is the A-A' line sectional view of the ELG component 14 in drawing 6 . Drawing 8 is the a-a' line sectional view of the ELG component 14 in drawing 6 . It is the substrate protective coat

which consists of the alumina with which 25 was formed in nonmagnetic substrates, such as the Al Chick substrate, and 26 was formed on the nonmagnetic substrate 25. The lower shielding layer which consists of Sendust is formed on this substrate protective coat 26. The alumina layer 28 used as a lead gap is formed on the lower shielding layer 27, and well-known MR component section (sense section) 30 is formed on this alumina layer 28.

[0009] 31 and 31 are hard membrane layers which consist of CoCrPt for magnetic-domain control, and are connected to the both ends of MR component section 30. 32 and 32 are cash-drawer layers which consist of the hard membrane layer 31, the copper formed on 31.

[0010] The terminal column 33 which consists of copper etc. as shown in drawing 8 is formed in the edge of the cash-drawer layers 32 and 32. This terminal column 33 is formed by plating in the hole formed in the resist layer (not shown). A resist layer is removed.

[0011] On the cash-drawer layer 32 and 32 [the alumina layer 28 and], the alumina layer 35 which serves as a light gap at a lead gap list is formed. The overcoat alumina layer 36 which furthermore covers this alumina layer 35 and the terminal column 33, and turns into a protective layer is formed. It polishes until the terminal column 33 exposes this overcoat alumina layer 36, and the pads 22a and 22b for monitors which become the top face of the exposed terminal column 33 from a golden pad are formed.

[0012] The magnetic-head component 12 is also formed of well-known technique on the nonmagnetic substrate 25 according to the membrane structure as the ELG component 14 especially with the almost same structure of the sense section. The pads 18a and 18b for external connection are connected to the sense section (not shown) which consists of MR component of the component section 16 etc. through the internal cash-drawer layers 39 and 39 which consist of the terminal column 33 by the side of the ELG component 14, the terminal columns 38 and 38 (the dotted line showed to drawing 6) which consist of the copper formed similarly, copper, etc., and a hard membrane layer (not shown).

[0013] Similarly, the pads 20a and 20b for external connection are connected to the thin film coil conductor layer (not shown) of the component section 16 through the internal cash-drawer layers 42 and 42 which consist of the terminal column 33 by the side of the ELG component 14, the terminal columns 41 and 41 (the dotted line showed to drawing 6) which consist of the copper formed similarly, copper, etc.

[0014] The above-mentioned bar-like object 10 is stuck on a predetermined fixture (not shown), and the Pth page of drawing 6 is polished. MR component section 30 of the ELG component 14 and MR component section in the magnetic-head component 12 are polished by coincidence. A polishing fixture is equipped with press fixtures (not shown), such as a cylinder which presses the magnetic-head component 12 which makes each set, and the ELG component 14 according to an individual in a polishing side, and a polishing rate is adjusted, and it is controlled so that polishing of each magnetic-head component 12 is completed to coincidence.

[0015] In the case of polishing, the ELG component 14 is connected to a monitor (not shown) through Pads 22a and 22b, and the change in resistance of MR component section 30 by MR component section 30 being polished is measured. MR component section of the magnetic-head component 12 and MR component section 30 of the ELG component 14 are formed in isomorphism or a fixed analog. It is controlled by measuring the change in resistance of MR component section 30 to end polishing in the place where the change in resistance of MR component section by the side of the magnetic-head component 12 became measurable at, and MR height of MR component section by the side of the magnetic-head component 12 became a necessary value by this.

[0016] As mentioned above, MR height is controllable by high degree of accuracy arranging the ELG component 14 for monitors every magnetic-head component 12. After polishing termination, cutting removal of the ELG component 14 part is carried out, and the bar-like object 10 is completed by the magnetic-head component 12 of the piece of each.

[0017]

[Problem(s) to be Solved by the Invention] ELG component 14 part is only used as an object for monitors, and is a part unnecessary as a product, and since it is the part finally removed, in order to

obtain many magnetic-head components 12 from one bar-like object 10 as much as possible, it is desired for the width of face of the ELG component 14 to be narrow as much as possible.

[0018] By the way, drawing 9 shows the condition of having covered the terminal columns 33, 38, and 41 and having formed the overcoat alumina layer 36, after forming the terminal columns 33, 38, and 41 (height of about 20-30 micrometers). Although this overcoat alumina layer 36 is formed of sputtering, the abnormality growth phase 37 (a broken line shows) arises into the part which becomes the shade of a terminal column under the effect of the step hippo ridge of the terminal columns 33, 38, and 41 in that case.

[0019] If spacing of a terminal column is narrow, the abnormality growth phase 37 becomes high (drawing 10), and when exposing a terminal column by flattening polishing after membrane formation, a hole will open (in addition, Q shows a polishing side). In order to prevent this, spacing of terminal intercolumniation requires at least 100 micrometers. Moreover, if this abnormality growth phase 37 is cut also in case the ELG component 14 is cut, the abnormality growth phase 37 must be weak, therefore must cause a chipping, and must avoid. Therefore, it is necessary to also take 55 micrometers or more also of spacing between a terminal column and the cutting section. From the above, the width of face which forms the ELG component 14 was determined in the terminal column formation tooth space, it is required and there were at least 300 micrometers of limitations in narrow-ization beyond this.

[0020] Then, the place which this invention is made that the above-mentioned technical problem should be solved, and is made into the purpose is to offer the manufacture approach of the magnetic-head component which can narrow ELG component formation width of face, and can make [many] the number of picking of a magnetic-head component.

[0021]

[Means for Solving the Problem] This invention is equipped with the next configuration in order to attain the above-mentioned purpose. This invention namely, the bar-like object with which the magnetic-head component and the ELG component adjoined by turns, and were formed [two or more] In the manufacture approach of a magnetic-head component of polishing acting as the monitor of the resistance of the sense section of an ELG component, cutting and removing the ELG component section after polishing, and dividing the magnetic-head component section into the piece of an individual It connects with the internal cash-drawer layer to which said adjoining magnetic-head component carries out the latest of the cash-drawer layer linked to the sense section of said ELG component through a connection. The pad for external connection formed in the top face of the terminal column which it connects with this internal cash-drawer layer, is formed, and carries out the latest to said ELG component, and the pad for monitors of said ELG component by connecting through a connection It is characterized by making serve a double purpose and using said terminal column for said object for magnetic-head components, and ELG components.

[0022] Said magnetic-head component is a magnetic-head component of the side component arrangement mold with which the component section was formed in the edge side, and the pad for two or more external connection connected through this component section, an internal cash-drawer layer, and a terminal column was formed in other parts. The pad which is one side near the pad for external connection of said magnetic head between two pads for monitors of said ELG component It connects with one cash-drawer layer by the side of an ELG component through said connection through said pad for external connection, said terminal column, said latest internal cash-drawer layer, and said latest connection. What is connected to the sense section of an ELG component through the terminal column and the cash-drawer layer of another side which were formed in the ELG component side can be used for the pad for monitors of said another side.

[0023] Said magnetic-head component on moreover, both sides which the component section is formed in a central site and sandwich this component section Are the magnetic-head component of the pin center, large component arrangement mold with which the pad for two or more external connection connected through this component section, an internal cash-drawer layer, and a terminal column was formed, and two pads for monitors of said ELG component mind said connection. What is connected to the sense section of an ELG component through the cash-drawer layer by the side of said pad for

external connection which carries out the latest, said terminal column, said internal cash-drawer layer, said connection, and an ELG component can be used.

[0024] As mentioned above, width of face of an ELG component can be narrowed, therefore the number of picking of a magnetic-head component can be made [many], and productive efficiency can be raised with omitting the terminal column currently conventionally formed in the interior of an ELG component, and using the terminal column by the side of a magnetic-head component.

[0025]

[Embodiment of the Invention] Hereafter, the gestalt of suitable operation of this invention is explained to a detail based on an accompanying drawing. Drawing 1 is the front view of the bar-like object 50. Drawing 2 is the B-B' line sectional view of drawing 1 . Drawing 3 is the c-c' line sectional view of drawing 1 . Drawing 4 is the b-b' line sectional view of drawing 1 . The same member as drawing 6 , drawing 7 , and drawing 8 is shown with the same sign, and omits explanation. In addition, the A-A' line sectional view of drawing 1 becomes the same mode as drawing 7 , and the a-a' line sectional view of drawing 1 becomes the same mode as drawing 8 .

[0026] He does not form the terminal column 33 (drawing 8) which consists of the copper linked to 22a for the monitors of the ELG component 14 etc., but is trying to use the terminal column 41 nearest to the ELG component 14 in the magnetic-head component 12 which adjoins instead of this terminal column 33 with the gestalt of this operation. Therefore, he is trying to connect pad 20a and pad 22a by the narrow connection 51. Moreover, as shown in drawing, the cash-drawer layer 32 which consists of the copper by the side of the ELG component 14 by the side of a inner layer etc., and the nearest internal cash-drawer layer 42 by the side of the magnetic-head component 12 are connected by the narrow connection 52.

[0027] In case a connection 51 makes the golden pads 20a and 22a by sputtering, it is natural. [of making to coincidence] Moreover, in case a connection 52 also makes the cash-drawer layer 32 and the internal cash-drawer layer 42 by sputtering, it can be made to coincidence. With the gestalt of this operation, one terminal column 33 which will be accepted the ELG component 14 side which existed between the terminal column 41 and the terminal column 33 is conventionally ommissible so that clearly [drawing 2].

[0028] In drawing 2 , even if it narrows ELG component 14 formation width of face, since the width of face between the terminal column 41 and the terminal column 33 can be set up sufficiently greatly, it can make small generating of the abnormality growth phase of the overcoat alumina layer 36 between both-ends child columns. Therefore, even if it cuts and removes the ELG component 14, fear of chipping generating is cancelable. Moreover, after cutting and removing the ELG component 14, a part of connection 51 and connection 52 will remain in the magnetic-head component 12 side, but since the connection 51 and connection 52 which remain are short, affecting an electrical property does not almost have them.

[0029] Although the terminal column 41 linked to pad 20a for record was shared as a terminal column by the side of the ELG component 14 above When the pads 18a and 18b for playback are arranged at the ELG component 14 side, of course, the terminal column 39 of the side near the ELG component 14 of the terminal columns 39 linked to the pads 18a and 18b for the playback concerned is shared.

[0030] Moreover, above, the gestalt of operation in the side component arrangement in which the component section 16 is located in the edge of the magnetic-head component 12 (slider) was shown. As shown in drawing 5 , in the case of the magnetic-head component 12 of the pin center, large component arrangement arranged between the pads 18a and 18b for playback, and the pads 20a and 20b for record, the component section 16 can set up the width of face of the ELG component 14 still more narrowly.

[0031] That is, in this case, the latest is carried out to the both sides of the ELG component 14, and pad 18a for playback of one magnetic-head component 12 and pad 20b for record of the magnetic-head component 12 of another side are located. Therefore, the both-ends child columns 33 and 33 of the ELG component 14 are omitted, pad 22a of the ELG component 14 is connected to pad 20b by the narrow connection 53, and pad 22b of another side of the ELG component 14 is connected to pad 18a by the narrow connection 54. Moreover, it connects with the internal cash-drawer layer 39 of the magnetic-

head component 12 which connects one cash-drawer layer 32 of the ELG component 14 by the side of a inner layer to the internal cash-drawer layer 42 of the adjoining magnetic-head component 12 by the narrow connection 55, and adjoins the cash-drawer layer 32 of another side of the ELG component 14 by the narrow connection 56.

[0032] That is, the latest terminal columns 38 and 41 of two magnetic-head components 12 which adjoin the ELG component 14 are shared for the ELG components 14. Thereby, since a terminal column does not exist in the ELG component 14 side, the width of face of the ELG component 14 can be set as a still narrower thing.

[0033] Although the suitable example was given per this invention above and many things were explained, as for this invention, it is needless to say that many can be changed within limits which are not limited to this example and do not deviate from the pneuma of invention.

[0034]

[Effect of the Invention] According to the manufacture approach of the magnetic-head component concerning this invention, as mentioned above, width of face of an ELG component can be narrowed, therefore the number of picking of a magnetic-head component can be made [many], and productive efficiency can be raised with omitting the terminal column currently conventionally formed in the interior of an ELG component, and using the terminal column by the side of a magnetic-head component.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The front view of a bar-like object,

[Drawing 2] The B-B' line sectional view of drawing 1 ,

[Drawing 3] The c-c' line sectional view of drawing 1 ,

[Drawing 4] The b-b' line sectional view of drawing 1 ,

[Drawing 5] The front view of a bar-like object in case a magnetic-head component is a pin center, large component arrangement mold,

[Drawing 6] The front view of the conventional bar-like object,

[Drawing 7] The A-A' line sectional view of drawing 6 ,

[Drawing 8] The a-a' line sectional view of drawing 6 ,

[Drawing 9] The explanatory view of the abnormality growth phase in an overcoat alumina layer,

[Drawing 10] It is the explanatory view of the abnormality growth phase in an overcoat alumina layer.

[Description of Notations]

12 Magnetic-Head Component

14 ELG Component

16 Component Section

18a, 18b Pad for external connection for playback

20a, 20b Pad for external connection for record

22a, 22b Pad for monitors

25 Nonmagnetic Substrate

26 Substrate Protective Coat

27 Lower Shielding Layer

28 Alumina Layer

30 Sense (MR Component) Section

31 Hard Membrane Layer

32 Cash-Drawer Layer

33 Terminal Column

35 Alumina Layer

36 Overcoat Alumina Layer

38 Terminal Column

39 Internal Cash-Drawer Layer

41 Terminal Column

42 Internal Cash-Drawer Layer

50 Bar-like Object

51, 52, 53, 54, 55, 56 Connection

[Translation done.]

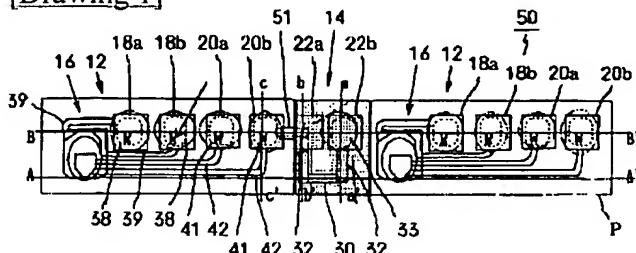
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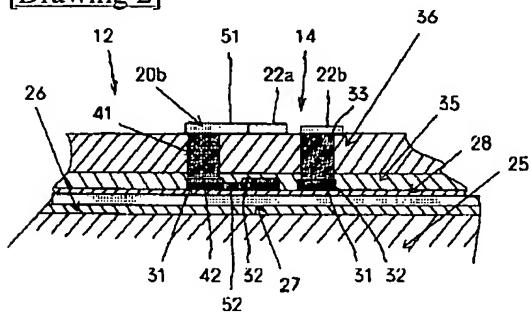
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DRAWINGS

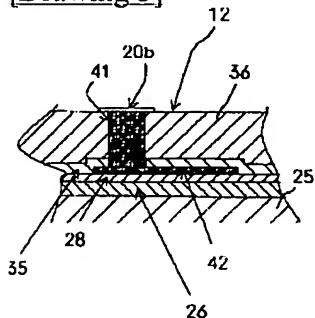
[Drawing 1]



[Drawing 2]

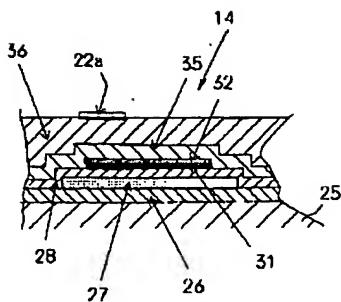


[Drawing 3]

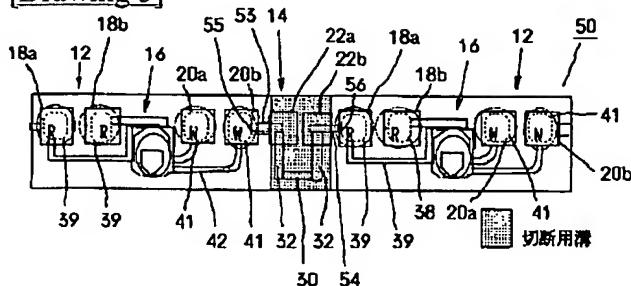


[Drawing 4]

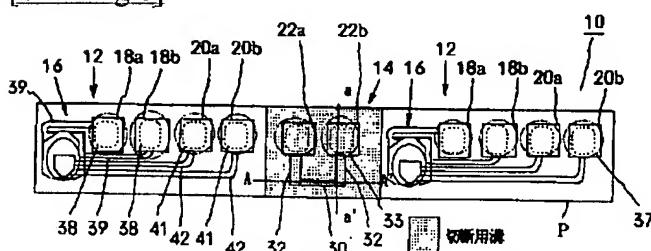
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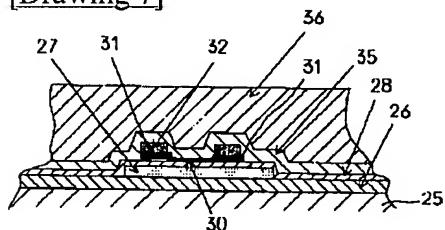
[Drawing 5]



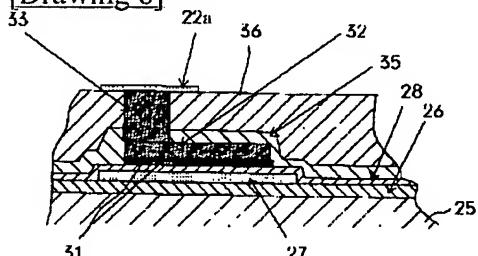
[Drawing 6]



[Drawing 7]

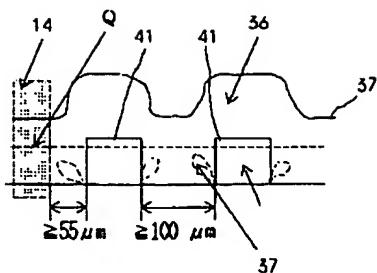


[Drawing 8]

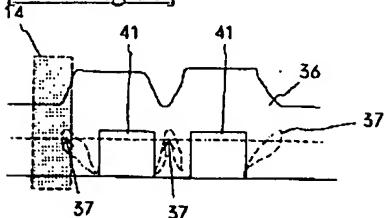


[Drawing 9]

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[Drawing 10]



[Translation done.]

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